Z axis. At this time, the line of sight vector tip F is moved according to the operating variables of the joystick **100** in place of the movement of the viewing point E.

In details, the mode switching is instructed according to the operation of the joystick **100** in the direction of Y axis so that the scrolling method in the case where the joystick **100** is operated in the direction of X axis is varied.

For example, when the joystick **100** is operated in the X axis direction by ΔX, the tip F of the line of sight vector is moved by $k3 \cdot \Delta X$ in the direction of X axis in parallel to the X axis as shown in FIG. **27**D. Thus, with the position of the viewing point E fixed, only the position of the tip F of the line of sight vector can be varied.

It is noted that, in place of the movement of the position of the tip F of the line of sight vector, the tip F of the line of sight vector may be rotated in accordance with the operation of the joystick **100** as shown in FIG. **27**E.

As described above, since the operation of the joystick **100** permits rotation of the viewing point E, movement of the viewing point E on the line of sight vector, and movement of the tip F of the line of sight vector, in the seventh embodiment, a more flexible scrolling can be achieved.

In addition, since only the operation of the joystick **100** in the direction of X axis permits the rotation of the viewing point E, the viewing point E can be rotated even if an inexpensive joystick such as to enable the movement thereof in the direction of only X axis. Consequently, the cost-effective vehicular navigating apparatus can be achieved.

Furthermore, since the mode switching can be made according to the specific operation, for example, the operation in the Y-axis direction of the joystick **100**, no switch is needed to switch the mode and, hence, the cost effective vehicular navigating apparatus can be achieved.

(Eighth Embodiment)

In an eight preferred embodiment, the scrolling of the displayed image road map is carried out according to a magnitude of a torsional force acted upon the joystick (hereinafter, referred to as a torsion quantity).

FIG. **24**C shows a contour of the joystick **100**A in the case of the eighth embodiment.

The joystick **100**A has the same profile as that **100** of the fifth to seventh embodiments but can be twisted with the Z axis as the center. The CPU **4** can detect the torsion quantity when the joystick **100**A is twisted. The torsion quantity can be detected by counting a number of pulses in a pulse train signal which is generated from a pulse generating member provided on a lower end of the joystick **100**A whenever the joystick **100**A is twisted by a predetermined quantity.

The difference in the eight embodiment from the fifth embodiment is the step S12B of FIG. **25**.

In the eighth embodiment, the position of the viewing point E is moved in accordance with the operating variables of the joystick **100**A in the same way as in the case of the fifth embodiment described above.

However, in the eighth embodiment, when the joystick **100**A is twisted and the torsion quantity at this time is denoted by $\Delta\theta$, the tip F of the line of sight vector is rotated by $k4 \cdot \Delta\theta$ (in radian).

As described above, the position of the viewing point E is moved according to the operation of the joystick **100**A except the torsion (twisting) quantity exerted on the joystick **100**A.

When the joystick **100**A receives the torsion quantity (twisted), the tip F of the line of sight vector is rotated. Thus, since both of the viewing point E and the tip F of the line of sight vector can be moved, a more flexible scrolling can be achieved.

Although in the eighth embodiment the tip F of the line of sight vector is rotated according to the torsion quantity acted upon the joystick **100**A, the viewing point E may be rotated according to the torsion quantity described above.

The same scrolling operation may be carried out in the same way as in either case of the sixth or seventh embodiments when the joystick is operated in the way except the torsion (twisting) of the joystick.

Although, in the fifth to eighth embodiments, the joystick **100**A **(100)** which can be operated through an arbitrary angle is used, such another type of joystick as being capable of being operated only in a predetermined direction for example, a numeral 8 type direction. Alternatively, as shown in FIG. **28**, a switch group **15** comprising a plurality of switches to instruct the scrolling direction and a switch **16** to instruct a change in the scale of the reduction of the road map may be combined with the joystick in order to instruct the scrolling direction.

Although, in the fifth to eighth embodiments, the scroll quantity is determined not only according to the operation direction of the joystick but also according to the operating variables of the joystick, the detection of the operating variables on the joystick may not be carried out but only the operation direction of the joystick may be detected and instructed, with the scroll quantity always constant.

Furthermore, the operation of the mode switch and a special operation of the joystick may permit the selection of one of the scrolling operations described in the fifth embodiment through the eighth embodiment.

As described hereinabove, since the vehicular navigating apparatus and methods according to the present invention, the bird's eye view of the road map is displayed on the display image screen of the display unit such that the viewing point is set on the upper sky located in the direction opposite to the set destination with the present position of the vehicle as the reference and the road map surrounding the present position of the vehicle is viewed from the viewing point, the part of the road map surrounding the present position of the vehicle is extended and the set optimum route of travel is displayed up to a location near the set destination in the continuous reduction scale image pattern. Hence, it is not necessary to provide a switch to change the reduction scale percentage and display range of the road map is not limited.

The invention should be understood to include all possible embodiments and modification to the shown embodiments which can be embodied without departing from the principle of the invention as set forth in the appended claims.

What is claimed is:

1. An apparatus for navigating a vehicle using a display unit, comprising:

a) road map storing means for storing a road map data related to a road map, the road map data including road network image data and character data related to the road map;

b) vehicle position detecting means for detecting a present position of the vehicle;

c) vehicle destination setting means through which a destination the vehicle is desired to reach is set on the road map;

d) start point setting means for setting a start point of location on the road map at which the vehicle is to start on the basis of the detected position of the vehicle;